

BATTERY TERMINAL

BACKGROUND OF THE INVENTION

The present invention relates to electrical connectors and especially to an electrical connector for coupling a single wire insulated electrical conductor to an electrical appliance. This application is a continuation-in-part of my previous patent application for Electrical Connector filed December 29, 1997, Serial No. 08/999,356 which is a continuation in part of previous patent application for Electrical Connector filed May 14, 1996, Serial No. 08/645,514, now U.S. Patent 5,704,814, dated January 6, 1998.

In the past, a wide variety of electrical wire connectors have been provided for connecting to wire ends. In a typical connector, the end of the wire is stripped of insulation and the bare wire is inserted into a connector where it can be soldered or clamped or otherwise attached to the connector. It is also common to tin the wire ends by coating the wire end with solder. A wide variety of connectors have been provided which removably hold the wire to the connector.

Typical electrical connectors are used in audio systems, such as in hi-fi speakers in which a wire end is stripped of the insulation and is inserted into an opening and then a threaded nut is used to removably attach the wire. Other connectors use spring clamps which allows a wire end stripped of insulation to be inserted into a connector opening with the spring clamp open and then releasing the spring clamp onto the wire. Reopening of the spring connector clamp allows the removal of the wire end. Other commonly

1 used connectors allow a stripped wire end to be
2 inserted into a conductive sleeve which is then
3 clamped with pliers to collapse a conductive sleeve
4 onto the wire. Automobile batteries are commonly
5 connected to the automotive electrical circuitry with
6 battery terminal connectors which are fixedly attached
7 to battery cables and mechanically clamped onto the
8 battery terminal posts.

9 Prior battery cable connectors can be seen in the
10 following U.S. Patents. The Potgieter U.S. Patent
11 number 4,270,827 is for a battery cable connector for
12 batteries commonly used in motor vehicles having
13 terminals in the form of cylindrical posts, which
14 connector includes a conical element which penetrates
15 the insulated wires of the battery cable end to spread
16 the wires out on all sides along a surface. In U.S.
17 Patent No. 1,856,018 an electrical connector and
18 terminal is shown which uses a conical wedge member
19 to lock the battery cable to the connector. In the
20 Anderson U.S. Patent Nos. 2,765,451 and 2,713,155, a
21 battery clamp uses a triangular tongue which is driven
22 into the end of the battery cable. U.S. Patent No.
23 1,258,304 is for a cable terminal which has a metal
24 end collar attached over the end of a battery cable
25 which is inserted against a piercing prong to make
26 conductive contact. U.S. Patent No. 1,247,656 to
27 Gadke is a terminal for conductors which has a
28 cylindrical sleeve which fits over the end of an
29 insulated conductor and a conical tip.

30 Prior U.S. patents which show electrical
31 connectors which used conductive prongs and which are
32 not used for battery terminal connectors may be seen
33 in the Chang U.S. Patent No. 4,013,333 for a wire
34 connector having two concentric sockets adapted to be

1 assembled one into the other and in which the inner
2 socket has a conductive needle mounted therein for
3 sliding a wire end into each end of the connector and
4 which uses a spike pressed into holes in the sleeves
5 to penetrate the coating of the wire ends. In the
6 Danner U.S. Patent No. 3,860,320, a dangler cathode
7 cable assembly is connected to a ball-like cathode
8 member by stripping the end portion of the cable and
9 inserting the end portion into a sleeve which is
10 pressed into an undersized tapered socket and which
11 has a pointed pin therein. In the U.S. patent to
12 Friedhelm, No. 4,786,760, a cable connector for a
13 piezoelectric cable has an insulated cable end which
14 is inserted into a sleeve. In the U.S. patent to
15 Berman, No. 4,091,233, an electrical connector and a
16 method of connecting an electrical cable to the
17 connector is provided for connecting one or more
18 insulated electrical cords or cables together. The
19 insulated cable ends can be inserted into the
20 receptacles on either end and onto a prong of
21 electrically conductive material so that the prong is
22 an electrical contact with the wire of an insulated
23 cord end. A container of adhesive material on the
24 end of the receptacle is released from the container
25 to create a physical bond between the cord and the
26 connector to hold the cord within the connector. In
27 my prior U.S. Patent No. 5,403,201, an electrical
28 connector is coupled to an insulated electrical
29 conductor without stripping the end of the insulated
30 conductor. The insulated wire is held with a spring
31 clamp which allows the wire to be released.

32 The Komada U.S. Patent No. 4,374,458 is for a
33 method of connecting a co-axial cable to a connector
34 having a plurality of connections. The Herrington U.S.

1 Patent No. 916,313 is for a spark plug having a spark
2 plug wire connector on the end thereof. The Despard
3 U.S. Patent No. 3,097,035 is for another electric
4 cable connector for use between sections of flexible
5 multi-conductor cable as used with portable electric
6 power consuming equipment and to a fixed power outlet.
7 The Polidori U.S. Patent No. 3,633,147 has a connector
8 for underground utility applications.

9
10 SUMMARY OF THE INVENTION

11
12 An electrical connector is provided for coupling
13 a single wire electrical cable to the terminal of an
14 electrical appliance. The connector includes a body
15 portion, a compression collar, and an end cap. The
16 body portion has an elongated axis at one end of which
17 is a battery terminal attaching portion and at the
18 other end of which is a cable receiving portion that
19 has a threaded outer surface and an internally
20 positioned electrically conductive prong for
21 penetrating the end of an electrical cable. The
22 compression collar is sized to fit over an electrical
23 conductor and has gripping fingers for engaging the
24 surface of an electrical conductor. The end cap has
25 an opening through which a cable can be inserted and
26 includes threads on the inner surface for mating with
27 the threads on the body portion. In practice, an
28 electrical conductor is inserted through the opening
29 in the end cap and through the compression collar and
30 impinged onto the conductive prong of the body
31 portion. Then the end cap is threaded onto the body
32 portion, engaging the compression collar and forcing
33 the gripping fingers of the compression collar into
34 engagement with the surface of the electrical

1 conductor and thereby forcing the electrical conductor
2 into tight engagement with the conductive prong of the
3 connector.

4
5 BRIEF DESCRIPTION OF THE DRAWINGS

6
7 The objects, features, and advantages of the
8 present invention will be apparent from the following
9 written description, the claims, and the drawings in
10 which:

11 Figure 1 is an exploded sectional view of a
12 battery terminal in accordance with the present
13 invention;

14 Figure 2 is an exploded perspective view of a
15 second embodiment of the battery terminal of the
16 present invention;

17 Figure 3 is an exploded sectional view of a
18 battery cable having battery terminal connectors
19 attached thereto in accordance with the present
20 invention; and

21 Figure 4 is an exploded perspective view of
22 another embodiment of the battery terminal of the
23 present invention.

24
25 DESCRIPTION OF THE PREFERRED EMBODIMENTS

26
27 Referring to Figure 1 of the drawings, an
28 electrical connector 10 is illustrated having a
29 connector body 11 with a battery terminal connecting
30 portion 12 with an opening 13 which slips over the
31 post of a battery terminal and allows the connector
32 arm portions 14 to be pressed together to attach the
33 body 11 to a battery terminal post. The terminal
34 connector body 11 is generally made of an electrically

1 conductive material, such as lead, and the body 11 has
2 a bore 15 with internal threads 16 and a conductive
3 prong 17 attached to or integral with the body 11 and
4 extending axially into the bore 15. The terminal
5 connector of Figure 1 has a locking end cap 18 with
6 external threads 20 and having an opening 21 sized to
7 receive a battery cable 22 therethrough. The cable 22
8 may be without or with an insulated cover 23 over an
9 electrical cable conductor 24, as illustrated. A
10 compression collar 25 has a plurality of tapered
11 gripping fingers 26 and is sized to permit the cable
12 22 to pass therethrough.

13 In operation, the cable 22 is inserted through
14 the cap 18, through the gripping collar 25, and into
15 the bore 15 where it is driven upon the electrical
16 conductive prongs 17. The cap 18 has a tapered
17 internal surface 27 which drives against the tapered
18 gripping fingers 26 of the compression collar 25 as
19 the cap 18 is threaded onto the threads 16 of the body
20 11. This connector makes for a rapid connection of a
21 battery cable to a battery terminal connector and
22 allows for the rapid exchange of the terminal
23 connector should the terminal connector become
24 corroded.

25 Turning to Figure 2, a cable connector 30 is
26 illustrated for connecting two cables together end-to-
27 end and includes a center cable body 31 having
28 external threads 32 and 33 thereon and an electrically
29 conductive prong 34 on one end and an electrically
30 conductive prong 35 on the other end thereof. A pair
31 of gripping collars 36 and 37 each has a plurality of
32 gripping fingers 38 having pointed tips 40 for driving
33 into the insulation on a piece of cable 41 or 42
34 placed through the gripping terminals 36 and 37. The

1 cutting edges 40 will cut through the insulation on
2 the cables 41 and 42 to grip the electrical conductor
3 inside the insulation as well as hold the cable to
4 the central body portion 31. Locking caps 43 and 44
5 each have internal threads 45 which can be slid over
6 the cable 41 and 42. Cable 41 can be passed through
7 the gripping collar 36 and pushed against the
8 conductive prong 34 to make for an electrically
9 conductive connection. The fingers 38 can then be
10 compressed to compress the cutting edges 40 into the
11 cable 41. The cap 43 has its threads 45 attached to
12 the threads 32 to lock one end of the cable 41 to the
13 connector body 31. Similarly, the cable 42 is passed
14 through the locking cap 44, through the gripping
15 collar 37 and driven onto the electrical conductive
16 prong 35. The collar 37 can then be clamped onto the
17 cable 42 and the cap 44 threadedly attached to the
18 body 31 to connect two electrical conductive cables
19 together.

20 Turning to Figure 3, a battery cable 50 has
21 terminals on both ends. The terminal connector 51 at
22 the one end of the cable 50 is for attaching to a
23 battery terminal post and the electrical connector 52
24 on the other end of the cable 50 is used for attaching
25 grounding cable to the automotive chassis or to an
26 electrical conductor in the electrical system of a
27 car. The battery cable 50 has an insulation 54 and an
28 electrical conductor 55 therein. The electrical
29 connector 52 may be made of an electrical conductive
30 material having a body 56 with an aperture 57
31 therethrough for attaching to the chassis of an
32 automobile or the like. An internal bore 58 has
33 internal threads 60 therein and an electrically
34 conductive prong 61 protruding axially into the bore

1 58. A cable locking cap 62 has external threads 63
2 which mate with the internal threads 60 of the body
3 portion 56. A gripping collar 64 has a plurality of
4 angled gripping fingers 65 and has a generally
5 cylindrical body 66 extending through the bore 67 and
6 passing through the cap 62. A flanged area 68 holds
7 the gripping collar 64 along one end 70 of the cap 62
8 while a flared flange 71 extends over the edge 72 of
9 the cap 62. Holding the gripping collar 64 to the cap
10 62 in this manner allows the gripping collar to rotate
11 within the cap 62 within the bore 67. This in turn
12 allows the cable 53, once attached, to have a small
13 amount of rotational movement to prevent undue
14 stresses from building up on the connection to the
15 terminal portion 56. The cable 53 is inserted through
16 the gripping collar 64 in cap 62 and is impaled on the
17 prong 61. The cap 62 is then threadedly connected
18 with the body 56. The battery terminal connector 51
19 has a battery terminal opening 73 and has a bolt 74
20 and a nut 75 for drawing the arms 76 together in the
21 same manner as a conventional battery terminal.

22 Turning to Figure 4, a cable connector 80 for
23 connecting to the end of an electrically conductive
24 cable 81 includes a connector body 82 having an
25 attaching aperture 83 and external threads 84. The
26 body 82 also includes a plurality of gripping fingers
27 85 attached thereto and extending from one end thereof
28 which defines a cylindrical cavity 87 surrounding an
29 electrically conductive prong 86 extends therefrom
30 into a bore 87. A locking cap 88 has internal threads
31 which mate with the threads 84 and has a bore 90
32 extending therethrough. The cap 88 also has a wrench
33 gripping surface 91 thereon.

34

1 In operation, the cable 81 is passed through the
2 bore 90 within the cap 88 and pass through the
3 gripping fingers 85 and into the cylindrical cavity 87
4 where it is impaled on the conductive prong 86.
5 Tightening the cap 88 onto the threads 84 of the body
6 82 then compresses the fingers 85 onto the cable 81
7 passing therethrough to grip the cable 81 and hold it
8 to the terminal body 82 while providing an electrical
9 contact between the prong 86 and the cable 81. The
10 cable 81 may have outer insulation 92 with an internal
11 electrically conductive cable 93 or can be bare cable
12 93 as desired.

13 It should be clear at this time that an
14 electrical connector has been provided which is
15 especially adapted for attaching a battery cable to a
16 battery cable terminal connector and which
17 advantageously allows the cable to be connected and
18 disconnected for replacement thereof as desired and
19 which allows for the rapid assemble of a battery cable
20 to any length desired without having to premake the
21 cables in a wide variety of lengths. It should,
22 however, also be clear that the present invention is
23 not to be considered limited to the forms shown which
24 are to be considered illustrative rather than
25 restrictive.

26